

Computer Programming

I

Course:	CSE 1100 - Introduction to Computing
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Outline

- Computational Thinking
- Abstraction
- Decomposition
- Pattern Recognition
- Algorithms
- Programming/Program Development

Computational Thinking

- Computational thinking describes the processes and approaches we draw on when thinking about problems or systems in such a way that a computer can help us
- Computational thinking is about looking at a problem in a way that a computer can help us to solve it

Abstraction

- process of filtering out – ignoring - the characteristics of patterns that we don't need in order to concentrate on those that we do.
- also the filtering out of specific details. From this we create a representation (idea) of what we are trying to solve.

<https://www.bbc.com/bitesize/guides/zttrcdm/revision/1>

Decomposition

- **involves breaking down a complex problem or system into smaller parts that are more manageable and easier to understand.**
- smaller parts can then be examined and solved, or designed individually, as they are simpler to work with.

<https://www.bbc.com/bitesize/guides/zqqfyrd/revision/1>

- Decomposition helps us solve complex problems and manage large projects

Pattern Recognition

- **involves finding the similarities or patterns among small, decomposed problems that can help us solve more complex problems more efficiently**

<https://www.bbc.com/bitesize/guides/zxxbgk7/revision/1>

Algorithm

- A series of instructions organised in a logical way to solve a problem
- Can be represented in multiple ways
 - Psuedocode
 - Flowchart
 - Narratives
- Are implemented as computer program (source code)

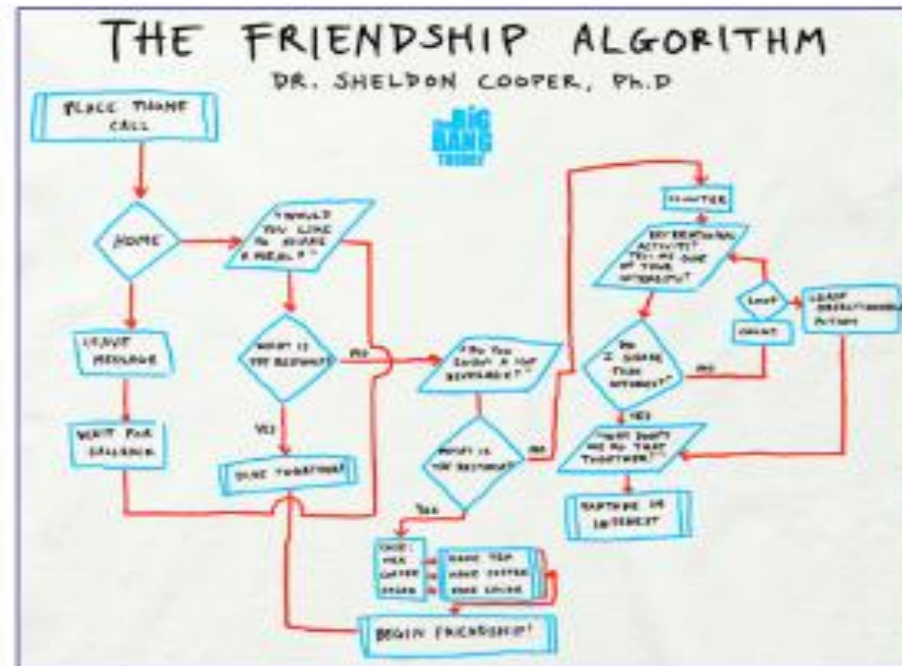
<https://www.bbc.com/bitesize/guides/zpp49j6/revision/1>

Algorithm

A finite set of steps that specify a sequence of operations to be carried out in order to solve a specific problem.

A better definition:

An algorithm is a well-defined, **unambiguous** sequence of steps



Algorithm

CompSci 101 - Principles of Programming

20

HOW TO GET
TO UNI

Algorithms – what kind of steps?

An algorithm is a well-defined, **unambiguous** sequence of steps

sequential
operations



Walk to the bus stop at the shops up the road

Get on bus number "101"

Pay the bus driver \$4.50

Get off at the Symonds St bus stop

Walk 200m to the Computer Science building



Algorithm

HOW TO
WALK TO THE
BUS STOP

Algorithms – what kind of steps?

An algorithm is a well-defined, **unambiguous** sequence of steps

conditional
operations

[

Open the front door

IF it is raining **THEN**

take an umbrella

Walk down the driveway and turn left

Walk 50m down the street



Algorithm



Algorithms – what kind of steps?

An algorithm is a well-defined, **unambiguous** sequence of steps

iterative
operations

Open wallet

[

WHILE you still haven't paid enough
give the driver another coin

Take a seat

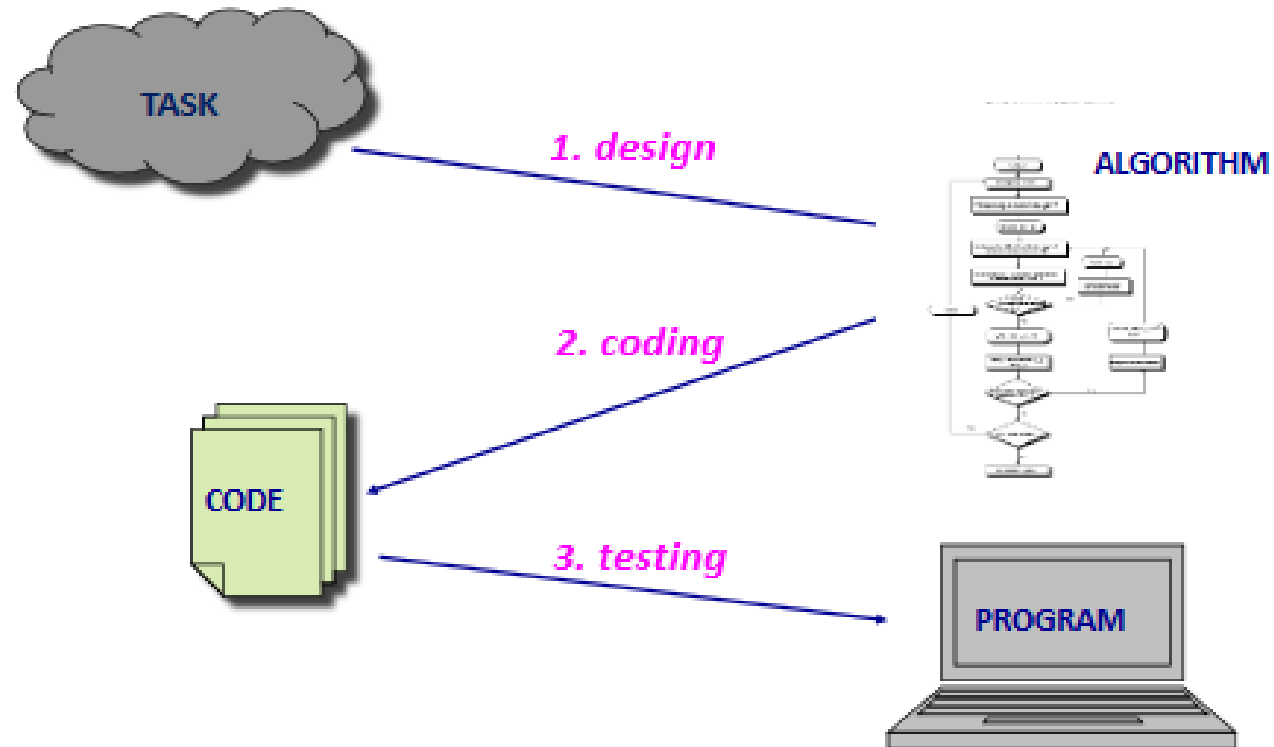


Programming

- process of designing and building an executable computer program for accomplishing a specific computing task. - https://en.wikipedia.org/wiki/Computer_programming
- a way of giving computers instructions about what to do. (instructions are written by programmers and using a computer programming language e.g. Python)

Programming Process

Basic programming steps



Sample Algorithms

1. Write an algorithm to computer the average of two numbers

Sample Algorithms

**2. Write an algorithm to compute the average of a set of n numbers
(numbers are entered by user from keyboard)**

Sample Algorithms

3. Write an algorithm to compute the highest and the lowest of the set of n numbers (numbers are entered by user from keyboard)

End of Lecture!!!